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Catalytic Preparative Chlorination of Cyclohexane with Tetrachloromethane in the Presence of Palladium Compounds

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Abstract

The reaction of cyclohexane with tetrachloromethane to yield cyclohexyl chloride and chloroform (metathesis of the alkane C-H bonds and tetrachloromethane C-Cl bonds) is efficiently catalyzed by the PdX2L2 palladium compounds (X = Cl, Br, I; L = PPh3, P(p-Tol)3, MeCN) at 70-120°C. Several types of catalytic systems differing in activity by three orders of magnitude are suggested. The most efficient system is one that contains triphenylphosphine complexes of palladium(II) dihalide, acetonitrile, and potassium carbonate, which provides the preparative yields (up to 83% with respect to hydrocarbon) of the metathesis products.